SSVEO IFA List **Date:02/27/2003**

STS - 76, OV - 104, Atlantis (16) **Time:04:04:PM**

Tracking No	Time	Classification	Documentation		Subsystem
MER - 1	**MET:** Prelaunch	Problem	**FIAR**	**IFA** STS-76-V-01	HYD
MMACS-01	**GMT:** 082:08:08:00		**SPR**	**UA**	**Manager:** D. Allison x39033
			IPR 79V-0004	**PR** Hyd-0681	**Engineer:** J. Wiltz x39009

Title: Hydraulic System 3 External Leak (ORB)

Summary: Hydraulic system 3 experienced an external leak of hydraulic fluid throughout the ascent run. The leak rate was approximately 1% per minute, for a total of 20% leaked. The main engine TVC isolation valve was closed in an unsuccessful attempt to isolate the leak. The APU was taken to low press and the leak rate decreased significantly. Hydraulic system 3 has been stable since APU shutdown and system 3 circ pump runs have not affected the system 3 reservoir quantity. The exact location of the leak is not known, but it is suspected to be in the aft compartment. The management of the APU/hydraulic systems during FCS C/O and entry has been determined. FCS C/O was performed using a circ pump. APU 2 was started pre-deorbit and APU 1 was started at EI-13. Systems 1 and 2 were taken to NORM pressure at EI-6 minutes. APU 3 was started at TAEM and remained in low press because it was not needed. APU 3 was shut down at wheel stop. Prior to APU 3 start, hydraulic system 3 reservoir quantity was 41.6% and increased to 44.0% upon landing. This indicates that the leak observed during ascent was minimized by leaving APU 3 in low pressure. APUs 1 and 2 were taken to high speed at TAEM and returned to normal speed after APU 3 shutdown . The weather placards for the loss of a single APU were observed.

Hydraulic fluid was found in the aft compartment. The highest amount of mist found in the rear portion of the righthand side towards the top of the aft. Some puddling of fluid seen along the center floor area aft of AV Bay 6. The total quantity aspirated is small so far about a quart or less. The fluid splattered as a mist around the inside of Vent Door 8 and 9 on the lefthand side. No data has been taken on the righthand side. External inspections found signs of hydraulic fluid in a film form around the Engine 1 and 3 Dome heat shields. The heaviest area is Engine 3 between the 8 to 12 o'clock position. The vent doors on both sides showed no indications of fluid. Leak checks were performed at KSC to locate source. No leak was discovered at return pressure. The hydraulic system supply was attached to the flexhose. With the system at 950 psi a leak was discovered at the flexhose to elbow joint. The B nut was subjected to 95 ft/lb with no movement. A X-ray of the joint was taken in place on 4-17-96 and then subsequently removed. The hose/elbow assembly was sent to RI Downey for failure analysis. Initial observations of the X-rays found indications of misalignment. The assembly had a blowing leak at 600 psi and when the assembly was dismantled the mating surfaces had crescent shaped deformations. KSC will be installing new hose and

elbow. The new hardware will be leak checked at 3000 PSIA. the pump to flexhose joint will be leak checked at low pressure in the OPF. A RCN is in work to require an APU hot fire at the pad.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 10	**MET:** 006:21:58	Problem	**FIAR**	**IFA** STS-76-V-02	RCS
PROP-02	**GMT:** 089:06:11		**SPR**	**UA**	**Manager:** J. Applewhite x39030
			IPR	**PR** LP03-0508	**Engineer:** T. Kelly x32340

Title: Primary Thruster L2L Failed Leak (ORB)

Summary: During RCS hotfire, RM software declared primary thruster L2L failed-leak on the second firing of the thruster when the oxidizer injector temperature dropped below the 30 deg F leak detect limit. The thruster had fired twice during the hotfire procedure with nominal results. The leak was visually confirmed by the crew. The crew isolated left RCS manifold 2. Plan is for KSC to replace thruster and L2D/L2U on same manifold. A Chit J4914 was prepared and requests the following: Remove all primary thrusters on LP03 manifold 2 and RP04 manifold 4 and send them to WSTF. All thrusters will be water flushed at WSTF with the exception of L2L (s/n 334) and L2U (s/n 222). These thrusters had been water flushed in 1994, three flights prior to failing on this flight. L2L and L2U will undergo oxidizer valve replacement at WSTF.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 11	**MET:** 006:21:55	Problem	**FIAR**	**IFA** STS-76-V-03	RCS
PROP-03	**GMT:** 089:06:08		**SPR**	**UA**	**Manager:** J. Applewhite x39030
			IPR LP03-0509	**PR**	**Engineer:** T. Kelly x32340

Title: Primary Thruster L2U Failed Off (ORB)

Summary: During RCS hotfire, RM deselected primary thruster L2U as failed off due to low chamber pressure (Pc). The maximum Pc achieved on the firing was 13 psia, whereas nominal Pc is 150 psia. This was the first attempted firing of the flight. Oxidizer and fuel injector temperatures dropped due to evaporative cooling, indicating at least partial pilot flow. Subsequent injector temperature response indicated none of the heat soak back normally associated with nominal combustion.

Plan is for KSC to replace thruster and L2D/L2L on same manifold. A Chit J4914 was prepared and requests the following: Remove all primary thrusters on LP03 manifold 2 and RP04 manifold 4 and send them to WSTF. All thrusters will be water flushed at WSTF with the exception of L2L (s/n 334) and L2U (s/n 222). These thrusters had been water flushed in 1994, three flights prior to failing on this flight. L2L and L2U will undergo oxidizer valve replacement at WSTF.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 12	**MET:** 006:22:18	Problem	**FIAR**	**IFA** STS-76-V-04	RCS
PROP-01	**GMT:** 089:06:31		**SPR**	**UA**	**Manager:** J. Applewhite x39030
			IPR RP04-0526	**PR**	**Engineer:** T. Kelly x32340

Title: Primary Thruster R4R Failed Off (ORB)

Summary: During RCS hotfire, RM software declared primary thruster R4R failed off due to low chamber pressure (Pc). The maximum Pc achieved on this firing was 10 psia, whereas nominal Pc is 150 psia. This was the first attempted firing of the flight. Oxidizer and fuel injector temperatures dropped due to evaporative cooling, indicating at least partial pilot flow. Subsequent injector temperature response indicated none of the heat soak back normally associated with nominal combustion.

Plan is for KSC to replace thruster and R4D/R4U on same manifold. A Chit J4914 was prepared and requests the following: Remove all primary thrusters on LP03 manifold 2 and RP04 manifold 4 and send them to WSTF. All thrusters will be water flushed at WSTF with the exception of L2L (s/n 334) and L2U (s/n 222). These thrusters had been water flushed in 1994, three flights prior to failing on this flight. L2L and L2U will undergo oxidizer valve replacement at WSTF.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 2	**MET:** 000:00:08	Problem	**FIAR**	**IFA** STS-76-V-05	HYD
MMACS-02	**GMT:** 082:08:21		**SPR**	**UA**	**Manager:** D. Allison x39033
			IPR	**PR** Hyd-0687	**Engineer:** J. Wiltz x39009

Title: WSB 3 Undercool (ORB)

Summary: The water spray boiler (WSB) for APU/hydraulic system 3 experienced an undercool condition during ascent. When the APU lube oil temperature reached 307 degrees F, WSB 3 controller B was selected. The WSB should control the APU lube oil temperature at approximately 250 degrees F. Thirty-one seconds after selecting the B controller, cooling was observed. After an expected overcool to 243 degrees F, the lube oil achieved a steady state temperature of 255 degrees F. The signature is

similar to that seen when there is a freeze-up of the WSB lube oil spray bar. Controller A will be removed and replaced. An ATP will be performed on the controller. Hamilton Standard will be shipping a replacement controller part no SV766501-3 s/n 00005.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 3	**MET:** 000:00:15	Problem	**FIAR**	**IFA** STS-76-V-06	HYD
MMACS-03	**GMT:** 082:08:28		**SPR**	**UA**	**Manager:** D. Allison
			IPR 79V-0018	**PR**	x39033
					Engineer: J. Wiltz
					x39009

Title: WSB 2 OvercoolsNo Ferry Impacts (ORB)

Summary: The water spray boiler (WSB) for APU/hydraulic system 2 experienced two overcools during ascent while operating on the A controller. In the initial overcool, the APU 2 lube oil return temperature dropped to 195 degrees F before recovering to nominal temperatures around 250 degrees F. The APU was shut down during the second overcool (the overcool was not the cause of the shutdown). At the time of APU 2 shutdown, the lube oil temperature had dropped to 193 degrees F. The overcool condition did not impact APU or hydraulics system operations.

WSB overcooling testing is scheduled for mid-April at Palmdale. The results from the testing will determine the actions to be taken on this controller.

Tracking No	Time	Classification	Documentation		Subsystem
MER - 16	**MET:** 009:02:47	Problem	**FIAR**	**IFA** STS-76-V-07	HYD
MMACS-05	**GMT:** 091:11:00		**SPR**	**UA**	**Manager:** D. Allison
			IPR 79V-0017	**PR**	x39033
					Engineer: J. Wiltz
					x39009

Title: WSB 3 Vent Heater Dropout On B Controller (ORB)

Summary: At 091:11:00 G.m.t., just prior to the entry deorbit burn, the WSB 3 vent temperature number 2 (V58T0366A) went off scale low (122 degrees F). Nominally, the heater should have cycled on at around 145 degrees F. The system was operating on the B controller at the time, and this signature indicated that the B heater had failed off. The system was switched to the WSB 3 A controller at 091:11:16 G.m.t. and a rise in vent temperature was observed a short time later. In order to better characterize

the problem, after about 30 minutes and nominal heater cycle on the A controller, the system was switched back to the B controller. Nominal cycling of the B vent heater was observed for the remainder of the flight. KSC will perform troubleshooting. A SPAR chit J4909 is in the system that requests heater resistance check and insulation resistance check to be performed.